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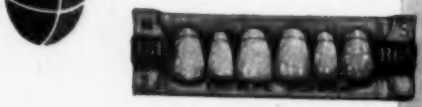

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Some Considerations in Water Fluoridation

Z. M. Stadt, B.S., D.M.D., M.P.H.

FORTY-THREE years ago, in May, 1908, McKay[1] of Colorado Springs, Colorado, began an investigation of what was then termed "mottled enamel" by his early associate, G. V. Black. Today the full import of McKay's patient and far-flung observations and the many studies which flowed from his original work are manifest in the extensive application of fluorides for dental health benefits.

Pittsburghers have played and are playing important roles in the unfolding story of the fluoride-dental relationship. Twenty years ago, Churchill [2] reported on fluoride in samples of water from areas of endemic dental fluorosis. It was Alexander E. Bard, one-time faculty member of the University of Pittsburgh, who prevailed on the Smiths of the University of Arizona to pursue studies which led them and Lantz[3] to the finding that fluoride in the drinking water was responsible for dental fluorosis. The simultaneous discovery of fluoride in the water by these research workers represents another instance of coincidence in science.

After extensive epidemiological research on the threshold of dental fluorosis, beginning in 1933-34,[4] and later, 1938 [5] on the relation of fluoride-bearing water and dental caries, Dean observed that the possibility of partially controlling dental caries through the water supply warranted thorough epidemiological-chemical study.

Speaking before the Western Pennsylvania Section of the American Water Works Association at Johnstown in September, 1939, Cox[6] stated that the treatment of water supplies by the addition of fluorides offered the most practical means of approaching the goal of sound teeth for children. He anticipated many of the questions that would arise in connection with fluoridation.

Studies by Dean and his associates, 1938-1942,[7] disclosed an inverse relationship between the presence of water-borne fluorides and dental caries. They noted that domestic waters with as much as 1.2 ppm of fluoride were associated with reduced dental caries experience and that dental fluorosis was of no esthetic importance.

Using the findings at Aurora, Illinois (water-fluoride 1.2 ppm) Arnold [8] observed that if neighboring fluoride-free water supplies were raised to about 1.00 ppm the following could be expected:

(a) Six times as many children having no dental caries experience.

(b) About a 60% lower dental caries experience rate.

(c) About a 75% decrease in the first permanent molar loss.

(d) Approximately 95% less dental caries in the proximal surfaces of the four upper anteriors.

In 1943, Ast [9] proposed a study to test the caries-fluorine hypothesis. And during the year 1945, studies were established at Grand Rapids, Michigan; Southbury, Connecticut; Newburgh, New York; and Brantford, Ontario.

Reports have been issued from these early study areas. Do the reported findings tend to confirm the observations made where the domestic waters contain natural fluoride? For example Wisan,[10] Klein [11, 12] and Weaver [13] showed that children moving into a community having fluoridized water would have dental health benefits. Klein [12] predicted that the earlier the age the greater the benefit, and that evidence of benefits would be

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observed in as short a period as two years. For all practical purposes, up to the present time, all children six years of age and over in all the study areas can be considered migrants, although in the present instances the fluoridized water was brought to the children. Bull [14] and Dean [5] observed reductions in the deciduous as well as the permanent teeth. Would this be observed in the study areas? Would there be an increase in the percentage of caries-free children? Would there be an increase in the percentage of low L. acidophilus counts?

The earliest report was issued by Erlenbach and Tracy in September, 1946.[15] They noted a 30% decrease in the incidence of new caries in previously sound teeth, as compared with a control group using fluoride-free water. All other reports indicate consistent and steady decreases in the prevalence of dental caries in the school age groups.

For the deciduous teeth, the 5-year-old children show dental caries reductions, such as 53.8% at Brantford, Ontario,[16] 59.9% at Newburgh, New York,[17] 38.9% at Grand Rapids, Michigan,[18] and 46.2% at Sheboygan, Wisconsin,[19] after periods ranging from 54 to 64 months of fluoridation. These are striking and important dental caries reductions for the deciduous teeth; more especially because generally they receive inadequate care.

The reports on the reductions in caries of the permanent teeth indicate substantial benefits, particularly for the children whose teeth have been exposed longest to the fluoridized water, and least to the previously fluoride-free water. At Newburgh, New York,[17] the overall reduction for the 6-12 age group was 32.5% after 48 months; Brantford, Ontario,[16] had a 31% reduction after 64 months for the 5-16 school age children; if the Grand Rapids, Michigan[18] findings are grouped (omitting the 7-year age group because examinations by grades did not provide sufficient numbers), we find that after 54-60 months there is a 24.9% reduction for the 6-12 age group. While these reductions have been observed, it is interesting to note that there have been some reductions in caries experience in the control cities. For example, for the permanent teeth the 6-year-old children at fluoride-free Kingston had a 30.5% reduction, while Newburgh 6-year-olds had a reduction of 77.6%. At fluoride-free Muskegon the 6-year-old children showed reductions of 22.2% for the permanent teeth, as compared with 51.3% for the same age group at Grand Rapids. Do the control city reductions represent a trend resulting from increased dental health consciousness?

Ast, Finn and Chase[17] comment on the decrease in untreated dental caries at Newburgh, pointing out that for the 6-9 age group there is a 68% reduction, compared to a 36% reduction for the same age group at Kingston. They note that this is significant in that it may lead to a point where the dental caries problem can be controlled, if the trend indicated continues.

What further decreases in caries experience can be expected? If the Aurora, Illinois,[18] findings are used as a standard, with 3.23 as the average DMF (decayed, missing, extraction required, or filled permanent teeth) for the 12-14 age group, then possibly six to seven more years will be required at Grand Rapids before a 12-14 age group will have conformed to the Aurora standard. With a DMF of 9.58 in 1944-45 and 8.01 in 1949-50, a 16.3% reduction has been effected. However, a total reduction of 65.9% would have to be achieved to attain the Aurora DMF standard of 3.23 for the 12-14 age group.

In non-fluoride areas Jay[20] has observed a fairly regular standard in the distribution of L. acidophilus counts. Fifteen per cent of the counts were low (0-100 colonies), while 57 per cent of the counts were high (20,000 or more colonies).

It has also been repeatedly demonstrated that L. acidophilus counts vary directly with caries experience and inversely with the fluoride content of the drinking water. In places with 1.00 ppm or more there are 37.4% low counts, and 27.5% high counts.[21] Finn and Ast[22] observed an 8.1% increase in low counts and a 16.2% decrease in high counts after three years (two of which were fluoridation years). Davies,[23] reporting from the Evanston, Illinois, study, noted a 4.9% increase in low counts (0-1,000 colonies) and a 5.1% decrease in high counts (over 1,000). At Charlotte[24] for the 6-12 age group, after 5-7 months of fluoridation there has been an increase in low counts for both white and Negro, and an increase in high counts for the Negro children; for the 14-18 age group, after 7-8 months of fluoridation, there is an increase in the low counts and a decrease for the high counts for both white and Negro children. Because of their preliminary character we are withholding specific data until the 1951 counts have been estimated.

With a general and rapid broadening of interest in fluoridation, many questions have been prompted throughout the country. One which can be dispatched immediately concerns the toxicity of fluoridized water and other fluoride application. Cox and Hodge[25] conclude that chronic, crippling fluorosis will never appear as a result of dental uses of fluorides, and that there is no other known toxic effect from drinking water containing 1.00 ppm than "very mild" mottling of the teeth. Dean[26] has described "very mild" fluorosis as "small opaque paper white areas scattered irregularly, involving less than 25% of the tooth surface." These are undetectable except by a trained examiner. In an investigation at Salida, Colorado, (1.3 ppm) by Frisch, McKay and Downs, Frisch [27] noted that they were able to make a positive diagnosis of fluorosed enamel in 91% of 414 native children examined, and that most of these cases were of the mild forms of fluorosed enamel, with exceptionally beautiful and caries resistant teeth. From the Newburgh study, Schlesinger, Overton and Chase[28] in a preliminary report, noted that three years after fluoridation began, special examinations, laboratory tests, and roentgen studies failed to disclose any significant deviations in any of the factors studied in groups of children ingesting fluoride, as compared with a control group.

The question of optimum concentrations of fluoride is a very real one. Is a standard year-round fluoride concentration desirable? This is not a consideration for the community providing a minimum of available management of fluoride levels, but it might be an important matter for the large urban centers. There is evidence that a re-evaluation of the threshold of dental fluorosis is necessary. Dean[29] has observed that for 12-, 13- and 14-year-old children at Brunswick (0.5 ppm) and Moultrie (0.7 ppm) in Georgia, there were incidences of the mildest type of dental fluorosis, 12.6 and 9% for Brunswick and Moultrie respectively. He observed that such incidences would normally be associated with domestic water having approximately 1 ppm under climatological conditions prevailing in the Chicago area, with its mean annual temperature of about 49° F.

The question of fluoride ingestion becomes of interest in places where at 1.00-1.50 ppm the optimum levels of caries-reduction may not be provided (colder climated), or where dental fluorosis results (Brunswick and Moultrie are indications). In some preliminary observations, Cox[30] noted that in Pittsburgh a person who drinks 40 to 50 ounces of water per 100 lbs. of body weight at a mean temperature of 60° F. will double that consumption at a mean of 80° F.

The question of water consumption and its relation to fluoride-ingestion has been considered at Charlotte.[31] R. S. Phillips (Supt. of Plants of the Charlotte

Water Department) and this writer, examined a variety of water consumption figures which might have some bearing on estimates of seasonal variations. Water pumpage and school consumption figures were considered unreliable, but figures for the bottlers of soft drinks indicated that they had a direct bearing on the seasons, with the total water used having a fairly constant relation to the total output of product. The month by month figures, monthly averages for three years, for six large bottlers, closely paralleled the curve of the mean monthly air temperature. The monthly sales variations for a bottler of spring water likewise paralleled the mean monthly air temperature. With this as a guide a schedule of monthly fluoride concentrations was established, varying from 0.60 ppm in July, to 1.10 ppm during January and February, with an annual average of around 0.90 ppm. We have been following this schedule since May, 1950, and will continue to until further information indicates the need for a revision.

This writer has been collecting observations from Charlotte mothers of 1-, 3- and 5-year-old children on the water intake of their children. A preliminary analysis[32] indicates that there is a 30 to 40% decrease in water consumption, as drinking water—distinct from all other fluids, when November is compared with July. The greatest decrease is for the 1-year-olds and the least for the 5-year-old children. No conclusions can be drawn until additional seasonal observations have been made.

A few notes on the Charlotte Fluoridation Demonstration may be of interest. The program is entirely local in origin and direction, with Dr. M. B. Bethel, Charlotte Health Officer, the chief administrator. A specific budgetary allotment is provided for the fluoridation program. We can report only one unusual experience; fluoridation at Charlotte started on April 25, 1949, and on May 21, 1949, it was suspended, after due consideration, because of an unusual increase in the percentage of shattered blocks of ice manufactured from the fluoridized water. Phillips and this writer[33] conducted an extensive investigation and confirmed the complaint. We determined, too, that when anti-crack tablets (frequently ammonium chloride) were employed, the number of imperfect blocks of ice was reduced to normal. "Anti-crack" tablets are used by ice manufacturers as tempering agents to prevent shattering when the ice is more rapidly produced at low brine temperatures. Following a full report to the Health Officer, the Board of Health and the ice manufacturers, it was agreed that fluoridation should be resumed. On August 4, 1949, fluoridation was started again and has been in regular operation, with interruptions of no special consequence. No other unusual incidents attendant to fluoridation have been reported.

As a dental public health measure, how has fluoridation been received throughout the country, and elsewhere? Starting in 1945, with four places and total populations somewhat less than 240,000 people, the Spring of 1951 finds fluoridation in progress in 18 states, approved in 14 others, under serious consideration in 9 others, and with only 7 states reporting no action.[34] In the Spring of 1951 (incomplete reports in many instances), 53 places with total populations of 1,400,000 have fluoridation in progress, 96 other places with populations of 6,150,000 people have had fluoridation approved, and in 113 other places, with total populations of 11,400,000, serious consideration is being given to the question. The possibilities exist (based on these incomplete reports) that by the end of 1951, 262 places in 41 states, with a total population of 18,950,000 will be engaged in water fluoridation. Since population estimates do not include all people receiving water on a distribution system, it

seems reasonable to add 10% to the aforementioned total. Hence, it is likely that 20 to 21 million people will be receiving fluoridized water by the end of 1951.

Hill, Jelinek and Blayney[35] have estimated that in 28 states around 3,000,000 people are using water containing natural 0.9 ppm fluorine and higher. When complete reports are available for all natural fluoride-bearing waters, it is likely that the total figure of these investigators will be increased by another 1,000,000 people. It is possible then, that by the end of 1951, 24 to 25 million people in the United States will be using water containing 0.9 ppm fluorine or more. This is around 26% of the 94 milllion people using water from some 15,400 public water supplies.[36] It should be noted that these estimates do not include 2,700,000 people in 28 states using water supplies containing 0.5 to 0.8 fluorine naturally.[35] For those critics concerned, from the aforegoing it is obvious that the addition of fluorides to a water supply is not mass medication, and that what will be added for some millions is already present as a natural component of the drinking water for millions of others.

Outside the United States, Brantford, Ontario, was one of the 1945 fluoridation programs. In Alaska, Anchorage (12,000 pop.) and Kodiak (2,000 pop.) are planning water fluoridation. In the Territory of Hawaii, Honolulu (245,523 pop.) and Hilo (27,019 pop.) are in the advanced stage of consideration. In short, water fluoridation is receiving widespread acceptance of dental caries and all the manifold sequelae.

Great credit must be given to McKay, and to Bull, Frisch, Hardgrove, Nichols and many others for bringing the dental health facts to the people in Wisconsin and others in many states. In March, 1945, the Wisconsin State Dental Society passed a resolution to the effect that ". . . public water supplies deficient in fluorides have their concentration raised to one part per million of fluorine. . . ." Today 80% of the people in Wisconsin, living in communities having a public water supply are either adding or getting ready to add fluorides.[37]

In terms of dental health conservation, the implications of water fluoridation take on profound significance. These are illustrated by citing the observations of McKay and Frisch [38] for Madison, Wisconsin, and Colorado Springs, Colorado. For example, at ages 25-29—a DMF of around 18 teeth instead of 4; at ages 35-39—an average tooth loss of 6.8 per person as compared with 0.3 per person at Colorado Springs. The expected percentage of persons caries-free may be as high as one-third. McKay's claim[38] that once the inhibitory effect of fluorine is acquired, it is permanent and is not diminished by later migrations, is supported by the observations of Deatherage[39] in his studies of selectees in Illinois.

The effect on malocclusion has been studied by Plater[40] who noted that in areas with 1.00 ppm, the incidence of malocclusion is reduced by 30%, presumably due to the prolongation of the life and function of deciduous teeth and the subsequent permanent 6-year molars.

The significance of water fluoridation in dental health conservation as it relates to dental manpower, is emphasized by the report of the dental member of the National Security Resources Board, Leo J. Schoeny.[41] He estimated that there would be a shortage of 9,200 practicing dentists in the United States by 1954, and that by 1960 (at the present rate of training), the shortage would be 10,700. Schoeny explained that if both acceleration and expansion of dental training were to be accomplished this year, there still would be a shortage of 1,700 dentists to meet all requirements in 1960. We must remember that the estimates are based on the dentist-population ratio (around 1-1750), not on the dentist-patient ratio (around

1-650). It is conceivable that we may approach a point where there are enough dentists for all the people, but that day is in the distant future—some 50 years from now, if that soon.

The impact of the benefits of water fluoridation on the practice of dentistry will be slow-growing over a long period of years. Reductions in caries experience will mean that the total units of service per person will be reduced considerably. For example, extensive bridge work, partial and full dentures, and extensive rehabilitation procedures will be the rare exception and not the rule. The cost of dental care, per person, will likewise be reduced. The dentist will be able to see many more patients. It will be more likely that the dental needs of children will be met. With the extensive forces of increasing dental health education in full swing, there will be no despairing backlog of unmet dental need. With an aging population, however, the periodontist will begin to play a more important role, for teeth will be retained longer and the supporting tissues will be subject to the atrophic changes of age.

Finally, if the benefits were to be only one-half or one-third as great as those noted, it would still be our responsibility to employ water fluoridation, or any superior measures that may be available in the future.

A glorious opportunity for dental public relations is beckoning.—*Health Department, Charlotte, North Carolina.*

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Engineering Aspects of Fluoridation

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F. J. MAIER, B.S. (M.E., C.E.), M.P.H.

LATEST reports from two of the largest cities adding fluorides to their water supplies continue to support the fluorine-dental caries hypothesis. Dean et al. reported (*Pub. Health Rep.*, Oct. 27, 1950) on the Grand Rapids study which began January 25, 1945, with the addition of 1.0 ppm fluorides. They showed that after nearly six years the DMF permanent tooth rates among 5-, 6-, and 7-year-olds were reduced 74.3%, 66.3% and 45.2% respectfully. Ast et al. reported (*J.A.D.A.*, Feb., 1951) on the Newburgh study where 1.0 to 1.2 ppm fluorides have been added since May 2, 1945. During a four-year period the DMF permanent tooth rate reductions among the 6, 7, and 8 year olds were 77.6%, 55.5%, and 42.1% respectively.

As a result of these and other similar reports, available data on communities whose water supplies contain naturally the optimum fluoride concentration, and the endorsement of the procedure by many of the important national professional societies, more than 70 communi-

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ties with a population of over 1.5 million are now adding fluorides to their water supplies.

OPTIMUM FLUORIDE CONCENTRATION

It has been suggested that the optimum fluoride concentration in water should be the highest dose which will produce not more than between 10 and 20 per cent fluorosis. Dean has demonstrated that the fluorosis experience is about 10 per cent in communities in the north-central area of this country having about 1.0 ppm fluorides naturally occurring in their water supplies. This does not mean however that 1.0 ppm fluorides would be the best concentration to use in all areas of the country. Where the environment stimulates a higher water intake, the fluoride dose should be lower. From the limited data so far collected perhaps the only conclusion that can now be drawn is that where a community has a mean annual temperature of about 55 to 60° F. the fluoride concentration should not be greater than 1.0 ppm.

SOURCES OF THE FLUORIDE ION

There have so far been four different compounds used as sources of fluorides for fluoridation. One of these, hydrofluoric acid, is so corrosive and dangerous to handle that the probability of its use in additional fluoridation projects is unlikely. The other three, sodium fluoride, hydrofluosilicic acid and sodium silicofluoride, appear at this time to be the most desirable compounds. In the future, many other compounds might become equally attractive. These would, however, have to become available in large quantities and at a comparable price and would not contain other ions which are ordinarily considered undesirable in water. The three compounds can now be used in plants of any size. The choice depends primarily on the ultimate cost of the installation during the predicted life of the feeding equipment. In the larger installations, this cost includes not only the compounds and the feeder, but also such items as labor, storage facilities, unloading equipment, safety devices and those unusual installation charges which are peculiar to almost every water works.

Of the three compounds, sodium silicofluoride is the least expensive from the standpoint of cost of available fluorides and for this reason may be chosen by most communities. However, in the larger plants, for example, it may well be found that the cost of unloading, handling, and storage of large quantities of this solid material is higher than the difference in chemical costs if hydrofluosilicic acid is used. This acid can be pumped from storage tanks and proportioned directly into the water with little further handling.

FEEDERS

The entire range of capacities of water treatment plants can be covered by either one of the three fluoride compounds. The amount of fluoride required depends on the quantity of water to be treated, the optimum F concentration desired, and the fluoride content of the raw water. In general, the choice of a feeder depends on the quantity of fluorides used and to a lesser extent on the type of fluoride compound chosen.

Solution feeders are those which proportion a given quantity of an accurately prepared fluoride solution during a specified time. The diaphragm types have definite upper and lower limits in capacity so that if larger or smaller quantities must be fed, the more expensive piston types must be used. Diaphragm types are suitable for feeding all three fluorides but their use is confined to the smaller plants. For feeding 1.0 ppm fluorides, the extreme ranges of plant sizes applicable for a single diaphragm feeder are: 0 to 1880 gpm for a 4% NaF solution; 0 to 295 gpm for a saturated solution of sodium silicofluoride at 40° F.; and 300 to 23,200 gpm for 22%

strength hydrofluosilicic acid. For plants larger and smaller than these limits using hydrofluosilicic acid, piston or centrifugal type pumps are indicated. In general, the smaller communities having limited supervision will probably find that the sodium fluoride saturator used in conjunction with a solution feeder is more satisfactory even though the fluorides will cost somewhat more.

Hydrofluosilicic acid, while a more expensive source of fluoride, may be chosen because its use obviates the necessity of preparing solutions, handling and emptying containers, and providing extensive storage space in the larger plants. For plants delivering less than 300 gpm, this acid could be used in the diluted form. However, as much effort would be required in making up acid solutions as for making solutions from the solid fluorides which are less expensive.

If the solid fluorides are chosen for plants whose capacities exceed those indicated for solution feeders, then dry-feeders are indicated. Volumetric feeders deliver a measured volume of material during a given time interval. Their range of feed can be varied from about 1.0 ounce per hour to 5000 lb. per hour. Their accuracy is in the order of 1 to 2% in the mid-feeding ranges but may become 5 to 6% at higher rates. For this reason, gravimetric feeders, which deliver a measured weight of material during a given time interval, might be preferred for the larger plants. For instance if the error of a volumetric feeder is 5% higher than a gravimetric at 25 lb. per hour, then it is possible to over-feed 1.25 lb. per hour. If the material costs 10 cents per lb., then $3.00 is lost per day or more than $1,000 per year. If this amount were added to the cost of a volumetric feeder, a more acurate gravimetric feeder could have been originally purchased.

Small feeders are generally connected electrically with the pump motors in order to stop the feeder when the pump is stopped. Manual adjustment of the rate of feed is easily made on all feeders when changes in the amount of water to be treated can be anticipated. If these changes are not predictable, feeding rates can be varied automatically with solenoid valves actuated either by a venturi or water meter.

Except for hydrofluoric acid, the mechanics of feeding fluorides are no more involved than those for other chemicals used in water purification. The major differences are that fluorides are toxic and that an overdosage is difficult to correct. An overdosage of 100% would be an almost unheard of error in chemical feeding. An error of this magnitude in fluoride feeding, however, would ordinarily increase the fluoride content to only 2.0 ppm which will produce no ill effects even if prolonged for several days. Nevertheless, the rate of feed should be maintained as closely as possible to that concentration which has been determined as the optimum for a particular community.

POINT OF APPLICATION

Fluorides can be applied to an untreated supply at any point where the rate of flow is known. These points might include the pump discharge or suction lines, the well itself, or a reservoir. For supplies requiring treatment, there are certain processes more or less commonly used in water purification which also have a tendency to remove the added fluorides. These include: alum or sodium aluminate coagulation, lime softening in the presence of magnesium, feeding of bentonitic clays, and the use of activated carbon at low pH values. As little as 10 ppm alum will remove about 0.1 ppm fluorides when 1.0 ppm was originally present. Chlorine can be added anywhere in the plant or distribution system. There are no known reactions between fluorides at 1.0 ppm and chlorine. At this concentration fluorides have no bacterical effects.

OTHER EFFECTS

At the fluoride concentrations used in fluoridation, the taste, odor, color, hardness and pH values are not affected. No complaints have been received from bottlers, brewers, bakeries, laundries or chemical plants. If sodium silicofluoride is used as the source of the fluoride ion, about 0.5 ppm SiO_2 is added concurrently with 1.0 ppm fluoride. This may be objectionable to consumers using such water for high pressure boilers.

After fluoridation is started, the fluoride content of sewage almost immediately reaches the level of the water supply. No adverse effects on sewage treatment processes have been reported.

Home water softeners using the salt-regeneration process do not remove the added fluorides.

SAMPLING

The standard test for fluorides is based on the decolorization of a zirconium-alizarin lake in an acid solution. The interference by other ions commonly found in water is considerable. Chlorine is probably the most universal interferring ion found in water. As little as 0.1 ppm chlorine will considerably decolorize the lake, producing an apparent increase in fluorides. Chlorine interference can be eliminated chemically or by dechlorinating the sample with ultra-violet light.

When the quantities of interferring ions is known to exceed the limits shown, the sample can be diluted with distilled water and the fluoride content of the aliquot determined in the usual way. If the concentration of the interferring ions is beyond the range of dilution, the sample should be distilled so that the distillate will contain all the fluorides and practically none of the interferring ions.

SAFETY MEASURES

The only known hazard related to the fluoridation of public water supplies is the exposure of water works operators to fluoride dust. Considerable experience on this hazard has been gained among fluoride manufacturer's employees who work continuously in an atmosphere of fluoride dust. Present practice in water plants is to obtain equipment of such size that the hoppers and solution tanks do not have to be replenished more often than once a day. This practice decreases the fluoride hazard almost to the point of insignificance. In the larger plants, however, where fluorides must be dumped from a barrel into a hopper, the dust generated is confined in dust collection systems. The operators also wear masks and rubber gloves. The coarser grade of sodium fluoride now available also contributes considerably toward reducing this hazard. This grade of fluoride contains very low percentage of particles capable of forming a dust.

STIMULATING FLUORIDATION

Most of the fluoridation projects have been started by dentists working through their local dental and medical societies. These groups have then presented their evaluations of reports containing factual and convincing proof of the benefits demonstrated at places long using water containing the optimum fluoride content, and lately at places where fluorides have been added artificially. As a result, other groups become interested and finally the local councils authorize the water departments to proceed. Opposition has almost invariably been a result of misinformation. The State health departments have always been consulted and their approval is generally required.

Funds have come either from the appropriation of the health or water department or from the general fund. The tendency now appears to be for the water department to finance such projects.—*Federal Security Agency, Public Health Service, Washington 25, D. C.*

Topical Fluorides in Today's Dental Caries Prevention Program

JOHN W. KNUTSON, D.D.S., DR. P.H.

THE immediate importance of a clear concept of the place of topical fluorides in today's dental caries prevention program was pointed up by a news release in last week's *Washington Post*.[1] This news release indicated that the Health Commissioner of Washington, D. C., was willing to sacrifice the topical fluoride program being conducted in the schools in order to insure that fluoridation of the city water supply not be postponed because of lack of funds. The Health Commissioner's offer was made as a counter-proposal to the decision of the City Commissioners that funds were not available to embark on a water fluoridation program at the present time. The word "sacrifice" is the key word in the Health Commissioner's proposal. It clearly implies that he wants both water fluoridation and topical fluorides, and that each has its place in today's dental caries prevention program. Furthermore, his statement implies an understanding and appreciation of the worth of topical fluorides which we cannot assume is universal today among health commissioners or even dentists.

Virtually all the scientific work on the uses of fluorides in dental caries prevention has been done during the last twenty years. An over-all review of this work makes it quite apparent that each new contribution to our knowledge stemmed from relatively simple and logical deductions. In 1931 when it was discovered that excessive fluorides in drinking waters was the cause of mottled enamel,[2,3] an immediate practical problem was presented: that of developing an effective, practical method of removing the fluorides. Chemists who undertook this developmental job were not long in supplying progress reports. In the late 1930's Elvove;[4] MacIntyre and Hammond;[5] and Adler, Klein, and Lindsey,[6] demonstrated that bone meal filters, tricalcium phosphate and various calcium phosphate compounds would absorb the fluorides. Their work was based on the well-established fact that fluorine has a high affinity for calcium. However, when these workers first suggested that the fluoride adsorptive property of these materials was probably due to the presence of hydroxyapatites, which is what tooth enamel is, the importance of their findings to dental caries research was not apparent.

It was not until the inverse relationship between fluorides in drinking water supplies and dental caries prevalence had been established that the next logical question arose. Since enamel is an hydroxyapatite why not gain the caries inhibiting benefits of fluorides by applying a fluoride solution directly to the enamel? The answer to this question was first sought in the laboratory where Volker and his associates found that powdered enamel absorbs fluorides[7] and that fluoride-treated enamel is more resistant to breakdown by acids than untreated enamel.[8] These laboratory findings, together with those of Armstrong and associates,[9] served as an incentive to several investigators to study the caries prophylactic effects of topically applied sodium fluoride solutions on human subjects.

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Chief, Division of Dental Public Health, U. S. Public Health Service.

Clinical tests were started in 1941 and have been continued to date. During this period several independent investigators, Bibby and associates;[10,11,12] Knutson, Armstrong and Galagan;[13-18] Jordan and associates;[19] Dwyer;[20] Chrietzberg;[21] and Rickles[22] in the United States; Tschappat in Switzerland;[23] Syrrist in Sweden;[24] and Hewat[25] in New Zealand, have reported the results of the use of topically applied fluorides under controlled clinical conditions in thousands of children and young adults. In general, the results demonstrate that a series of four applications of a 2 per cent sodium fluoride solution to the teeth effects a 40 per cent reduction in caries incidence.

Since 1947, comprehensive evaluations of the data on the clinical effectiveness of topically applied fluorides have been made by many individuals and by several of our scientific and health organizations. The Council on Dental Health and the Council on Dental Therapeutics of the American Dental Association,[26,27] the Michigan workshop on the Evaluation of Dental Caries Technics,[28] the Dental Section of the American Public Health Association,[29] the Association of State and Territorial Health Officers[30] and the U. S. Public Health Service and Children's Bureau have concluded that the caries preventive benefits of topically applied sodium fluoride have been established and should be made available to all children.

It was largely on the basis of these evaluations that the Congress of the United States appropriated $1,000,000 in 1948 for a nation-wide topical fluoride demonstration program.[31] Briefly, this program provided for the assignment of a demonstration unit, or team, staffed by a dentist, two dental hygienists and a clerk to each State. Under the general supervision of the U. S. Public Health Service and the immediate direction of the State Health Departments, the units conduct demonstrations in selected communities. The purpose of the demonstration program is to publicize the topical fluoride preventive procedure, to demonstrate the technic of application, and to show how this preventive might be brought to children on a mass basis. During the period of operation of the program more than 400 communities have established programs for making the service available on a continuing basis. In addition, many communities have made specific plans which have not been implemented because of a lack of the necessary personnel.

In spite of the excellent laboratory evidence and the large volume of well-controlled clinical experience supporting the conclusion that topical fluorides are effective in reducing dental caries incidence by approximately 40 per cent, there are still many dentists who doubt the value of topical fluorides and who feel that this method is still in the experimental stages. This is understandable. It takes time, usually a generation, for a new concept to be fully accepted. More important is the fact that far too many of those who have accepted topical fluorides and who are using them are not using them correctly and are thereby reducing their effectiveness. A discussion of the laboratory and clinical evidence as it relates to each step in the currently approved topical fluoride technic therefore appears desirable.

TECHNIC OF APPLICATION

1. *Cleanse the teeth.* Prior to the first of the series of four applications of sodium fluoride, the teeth are cleansed with a rubber cup and pumice paste. The cleansing is not a traditional dental prophylaxis and merely serves to remove the gross debris from the crown surfaces of the teeth. Results of extensive clinical testing[16,17,21] and the laboratory findings of Adler and Straub[32] indicate that this initial cleansing doubles the effectiveness of the series of applications. Recently Chrietzberg[19] demonstrated that cleansing of the crown surfaces of the teeth can be

accomplished as effectively by supervised tooth brushing as by the rubber cup and pumice method.

2. *Isolate the teeth with cotton rolls.* The second step in the topical fluoride technic is the most difficult and trying part of the whole procedure, a procedure which otherwise is relatively simple. It is a step which has been improved by observing the mouth habits of children and by a conscientious study of the dislodging forces which resist proper placement and retention of the cotton rolls in the mouth. For example, if the patient's head is in the vertical position and the mouth in the half-open position; if the cotton roll ends are cut at 30 to 45 degree angles, and those used in the lower mouth are retained by efficient cotton roll holders, and if simple plastic splints, or the patient's index finger, is used to retain the cotton roll in the upper mouth, the involuntary dislodging forces exerted on the cotton rolls by the cheeks, lips and tongue can be markedly reduced. Not only must the cotton rolls block off the flow of saliva onto the teeth but they must be placed and retained out of contact with the teeth so that the applied fluoride solution is not absorbed by them.

3. *Dry the teeth with compressed air.* After the cotton rolls have been positioned properly, the teeth are dried with compressed air. Twenty to thirty pounds air pressure is used to dry each tooth and its approximating surfaces. The importance of this step is reflected by one phase of Phillip's rather extensive laboratory work on the effects of fluoride solution on enamel in which he found that the effect is doubled when the solution is applied to a dry enamel surface.[33]

4. *Apply the fluoride solution and permit it to dry in air for about four minutes.* Pertinent to this phase of the technic is the type of solution used. The solution recommended is a 2 per cent sodium fluoride solution in distilled water. The solution is unbuffered and stored in ordinary glass bottles. It has been found that under these conditions of storage the pH of the solution increases from approximately neutral to 9.5 in a period of six months.[34] This is the type of solution which has been used in most of the clinical tests, however, and the type that has been associated with a caries reduction of approximately 40 per cent.

Although laboratory investigations suggest that under in vitro conditions a solution with a pH of 4.0 to 4.5 is more effective than a neutral or alkaline one,[35, 36] these laboratory results should not be interpreted to indicate that clinically an acid solution is more effective than a neutral or alkaline one. In fact clinical evidence resulting from several well-controlled studies clearly shows that an acid solution should not be used because it is not effective. These studies include those of Arnold and his associates,[37] Roberts,[38] Stones,[39] and Rickles.[22]

In effect, the period of drying of the fluoride solution on the tooth, is the exposure time of the tooth to the fluoride solution, about four minutes per application. The drying of the solution on the tooth then is not important, but the exposure time of the enamel to the fluoride solution is important. The results of laboratory work of Phillips,[33] Straub and Adler,[40] and Syrrist[41] indicate that this is an extremely important factor. Their in vitro studies show that there is a marked increase in enamel hardness and in fluoride uptake as exposure time to the fluoride solution increases to approximately 20 minutes. This finding is also in accord with the known pattern of chemical reaction of apatite structures. By and large, such structures react slowly and require time for molecular reorientation when undergoing chemical change.

Now to summarize some of the points made about the technic and the fluoride solution. 1. The initial cleansing, while

removing only the gross debris, has been shown to double the effectiveness of the fluoride applications. 2. Isolating and drying the teeth are extremely important, for laboratory work has shown that the solution is twice as effective on a dry tooth as it is on a wet tooth. 3. Clinical studies indicate that an acid solution is not effective, and therefore should not be used. 4. The results of both clinical and laboratory investigations indicate that the four-minute drying period is in effect the exposure period of the teeth to the fluoride solution. It is clear, therefore, that each step in the technic is of definite importance and that when any of them is slighted or performed incorrectly the effectiveness of the fluoride applications may be seriously jeopardized.

TOXICITY AND RELATIVE SAFETY OF TOPICAL FLUORIDES

Sodium fluoride is a toxic substance. In the form of a 2 per cent solution this would mean roughly 6 to 13 ozs., or 200 to 44 cc's of the solution. Inasmuch as only 3 to 4 cc's of the solution is used in making an application to the teeth, the margin of safety is wide. Nevertheless, it is important that the solution be used with reasonable caution and with an awareness of its toxic properties.

A solution of sodium fluoride acts as a mild irritant. The solution should not be used therefore in prepared tooth cavities prior to the insertion of filling materials. Using it thus would be contrary to good operative principles. On the other hand, simply because it has been shown that sodium fluoride acts as an irritant when sealed onto freshly cut dentin,[42, 43] we should not interpret these results as contraindicating the use of topical fluorides on open carious lesions. In the latter case, exposure of the open lesion to the saliva of the mouth on the one hand and the presence of uncut adventitious dentin on the other provide barriers to any irritating action of the solution.

VARIATIONS IN EFFECTIVENESS OF TOPICAL FLUORIDES

Since the use of topical fluorides effects only a partial prevention of dental caries, some notion of its relative value in cases with rampant caries, as contrasted with cases having a low attack rate, is important.

By combining the findings of four studies of the effect of topical fluorides on caries experience in children, we were able to analyze results obtained with roughly 1,000 children.[44] In Figure 1, the distribution of caries in fluoride treated mouth halves is compared with that in the control of untreated mouth halves. You will observe a strong tendency for the caries distribution in the treated mouth halves to be uniformly depressed throughout. Note that none of the treated mouth halves has more than three carious teeth, whereas in the untreated mouth halves several have as many as five, others as many as four. Note too that the percentage with three carious teeth is less for treated mouth halves than for untreated, and so on for the percentage with two and for the percentage with one carious tooth. These data definitely indicate that the depression in caries activity is remarkably uniform throughout and, therefore, that virtually every child treated with topical fluorides is benefited.

OTHER PRACTICAL CONSIDERATIONS

Although the effectiveness of a caries preventive agent must be determined from the results of controlled clinical tests with an adequate number of cases, certain practical considerations must be examined before final judgment of its usefulness can be rendered. Among these practical considerations, of course, are the toxicity and safety of the materials used, and the simplicity or complexity of the technic employed. These we have already discussed. In addition there is the matter of general acceptance by the dental profession and the public, and the cost of the

service. Although the dental profession has officially endorsed the use of topical fluorides and has advocated that the service be made available to children, many dentists have reservations regarding its practicability. This is due in part to their lack of familiarity with the technic and their misconception of the time required to make the applications. The technic is simple, but it is simple only when each step is mastered. Among the steps which must receive special consideration is the second—isolating the teeth with cotton rolls. After the various steps are mastered, the application can be completed in approximately 15 minutes in the private dentist's office. Where they are not mastered the usual time reported is from half an hour to 45 minutes and even an hour. This is an important practical consideration since a dentist must charge fees in accordance with the time required to render a given service.

The Congressional action which led to the establishment of the topical fluoride demonstration program previously referred to, and the fact that hundreds of communities have established programs for making topical fluoride service available to their children, attest to the public acceptance of this dental caries preventive measure. It is apparent that one of the outstanding characteristics of the program and one which contributes to its popularity is the fact that it constitutes a very tangible service. It is a service which is rendered on an individual basis and which can be seen, felt and consciously experienced. Certainly, no personal dental health service rendered to date has been received with as much public interest and support as the topical fluoride program.

PERCENTAGE DISTRIBUTION
OF FLUORIDE-TREATED AND UNTREATED MOUTH HALVES OF 1,032 CHILDREN
ACCORDING TO NUMBER OF TEETH ATTACKED BY CARIES DURING STUDY YEAR

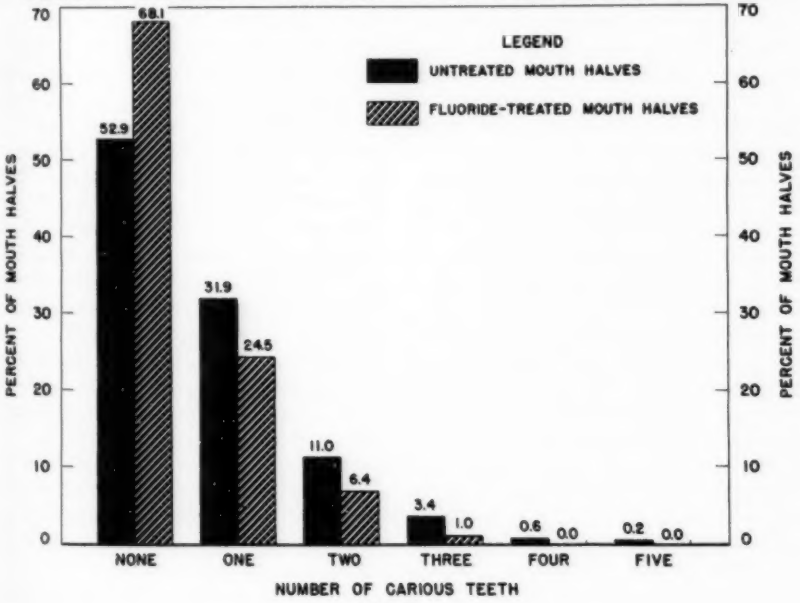

FIGURE 1

COST OF THE SERVICE

Insofar as possible and practicable, preventive health services should be made available to all on a mass basis. It has been demonstrated that dental hygienists can make these topical fluoride applications effectively. It has also been demonstrated that when the service is provided in school clinics, one hygienist using the multiple chair procedure can make fluoride applications to the teeth of roughly twenty-five hundred children per year. The cost of the service on a mass basis is approximately $1.50 per child for the series of four applications. Now if these are given to each child every three years in order to protect the new teeth as they come into the mouth, at ages three, seven, ten and thirteen years, then the annual cost per child is reduced by two-thirds. Certainly, if dental hygienists are used to make the service available to children on a public health basis, the cost will be reasonable. On the other hand, it should not be inferred from this analysis that the private dentist is not obligated to make this service available to his child patients. He is. Furthermore, he should charge a fee for the service which is commensurate with the fees charged for other dental service time.

TOPICAL FLUORIDES AND WATER FLUORIDATION

It has been conclusively established that the use of fluoride drinking water during the period when the teeth are forming is associated with a 65 per cent reduction in dental caries experience. It has also been adequately demonstrated that a similar effect may be obtained by adding fluorides artificially to the drinking water supply. Since the 65 per cent reduction is appreciably greater than the 40 per cent reduction obtained through the use of topical fluorides, since water fluoridation can be accomplished at a lesser per capita cost than that of administering topical fluorides, and since water fluoridation is a much simpler public health practice to carry out effectively than a topical fluoride program, a logical question is: Why not fluoridize the water supplies? The answer is that there are no good reasons for not fluoridizing a fluoride-free drinking water supply. We still hear many reasons, but they are all bad. Delay, postponement, and procrastination on fluoridation are costly pastimes that most taxpayers can ill afford. Failure to fluoridize means two-thirds more dental caries in future generations of children, many more tooth aches and extracted teeth, and a much greater need for dental fillings and bridges, partial plates, and other replacements, all of which cost money, to say nothing about the markedly reduced chances of having better dental health and all that goes with it.

Now if water fluoridation has all these desirable attributes, and to a greater degree than topical fluorides, the next question is: Where do topical fluorides fit into the picture, or, why not forget about topical fluorides? In the first place, we cannot forget about topical fluorides because roughly one-third of the population of this country resides in rural or semi-rural areas and uses drinking water from private wells. A practical method for fluoridizing the drinking water of private wells has not yet been developed. This means that topical fluorides should be used routinely in communities or areas where the individuals do not get their drinking water from a communal source or one which can be effectively fluoridized.

Secondly, the full benefits of fluoridized drinking water accrue only to those individuals who use such water during the formative period of the teeth, that is, from birth to age 8, so that the full benefits of artificially fluoridized drinking water will accrue only to future generations. There is evidence that during the early years of fluoridation the present generation will receive partial benefit, but this benefit decreases with increasing age.

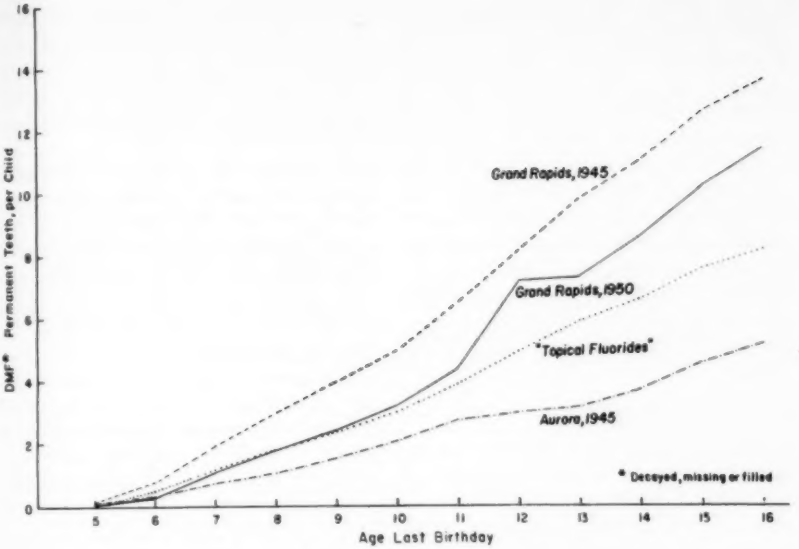

FIGURE 2

Dental Caries Experience (DMF) Permanent Teeth, in Grand Rapids and Aurora School Children

On the other hand, it has been clearly shown that topical fluorides effect a 40 per cent reduction in caries incidence regardless of the age of application up through young adulthood. It is clear then that to obtain the full benefits of fluorides in reducing caries incidence in today's children, topical fluorides and water fluoridation must be used in combination. Topical fluorides should continue to be used in communities which undertake water fluoridation until such time as the water fluoridation approaches its full effectiveness.

This point is demonstrated in Figure 2. Water fluoridation was begun in Grand Rapids, Michigan, in 1945. After five years of operation the prevalence of dental caries has been appreciably reduced in the permanent teeth of the 5- to 16-year-old children. However, by far the greatest reduction has taken place in the younger age groups, particularly the 5- and 6-year-old children who have used this drinking water since, or almost since, birth. It is expected that this prevalence curve for Grand Rapids will be similar to the one for Aurora, Ill., after fluoridation has been in operation for from 15 to 16 years. In Aurora, Ill., the drinking water supply naturally contains the optimum amount of fluorides. Superimposed on this graph is a theoretical caries prevalence line to indicate a 40 per cent reduction from the Grand Rapids 1945 base line which might be obtained through the use of topical fluorides. Note that through age 11, the Grand Rapids 1950 line and the topical fluoride line are almost superimposed, but beyond these ages there is an appreciable difference. It would be the purpose of topical applications during this transition stage to bring the optimum benefits of fluorides to those children of the present generation who did not develop their teeth on fluoridized drinking water.

If a community began fluoridation today, it should continue to render topical

fluoride services. If the community program has been established to provide this service for the 3-, 7-, 10-, and 13-year-old children, then during the first year of water fluoridation all of these children should continue to get the topical fluoride applications. After the first year, the 3-year-olds would be dropped. Two years later the 7-year-olds would be dropped; two years later, the 10-year-olds would be dropped; and two years later, the 13-year-olds. At the end of a seven to eight year period of water fluoridation then, the topical fluoride program could be terminated.

SUMMARY

The place of topical fluorides in today's dental caries prevention program is still very important. It remains the only practical method of utilizing fluorides in the prevention of dental caries among that one-third of the population residing in rural and semi-rural areas who are dependent on private wells for their drinking water. In addition, for that part of the population served by communal waters, topical fluorides should be used in combination with water fluoridation to effect the maximum utilization of fluorides as a preventive measure during the transition period until the children will have had the opportunity of obtaining the full benefits of water fluoridation.

In closing, it should be emphasized, however, that these two caries preventives are not the only ones that should be used in combination. Methods of effecting a reasonable reduction in sugar consumption, and the application of oral hygiene methods should continue to be employed. Used in combination, a very substantial reduction in dental caries can be assured. But even then, we must not forget that children will continue to get some dental caries. Therefore, we must continue to couple with this array of preventive services, regular periodic visits to dental offices to provide early detection and treatment of carious lesions. Prompt and conscientious application of this combination of preventive and control measures will bring us far along the road toward the elimination of the hazards of dental caries.—*Federal Security Agency, Public Health Service, Washington 25, D. C.*

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The Status of Fluoridation of Water Supplies in Pennsylvania

GERALD J. COX, PH.D.

THIS report is based on a rather hasty survey by questionnaire sent to twenty dentists in the larger cities of Pennsylvania. It is supplemented by information supplied by Dr. Linwood G. Grace, Director, Bureau of Dental Health of Pennsylvania.

In a letter of April 4 Dr. Grace said "Ford City is the only community in Pennsylvania which has made a definite application to the State Health Department. This application has been approved and I believe they are simply awaiting delivery of feeder equipment." This is the furthest advance of any community in the state toward fluoridized water. The author has heard, however, through a grapevine no longer than two dentists, that opposition exists in Ford City of the chronically uninformed type and there may still be needed some public instruction.

Replies were received by April 12 from fifteen dentists but two were out of the state and could give no information. The following summarizes reports from the others.

Most difficulties are to be expected in communities where the water supplies are privately owned which seems to be the situation in about half of those reporting. Where there are a number of communities served by one water company consent must be obtained in each before fluoridation can be started. For example, in the North Boroughs of the Pittsburgh area thirteen separate municipalities are supplied by one company. The Scranton-Springbrook Water Company serves many cities and also draws its water from 82 sources. This matter of multiple sources should not be a handicap if all are brought together into one pool and the waters are all low in fluoride, as they probably are.

Approval of fluoridation by the dental societies has been obtained in 10 of the communities reporting and by 6 of the medical societies. There have been discussions by municipal authorities in 8 of the 13 communities and approval, without funds, in 3. Approval of plans by state authorities was reported by 2 cities.

Opinions in newspapers and in service clubs have been reported as follows:

Editorial comment has been favorable in 8 of the cities and mixed with the favorable in 2. Letters from readers have been reported as favorable in 5 and mixed in 2.

The score for favorable discussion in PTA was 7 to 1. Discussion in Kiwanis, Lions and Rotary Clubs has been reported from 5 cities of the 13 reporting. In State College and Uniontown many other groups have reported favoring fluoridation.

Especially vigorous campaigns have been waged by dentists in Williamsport, Uniontown, and State College for fluoridation. In the first two of these towns the opposition comes from the water companies pleading especially difficult conditions. Progress in State College has been smoother.

Dean Appleton has written of Philadelphia that "a good committee, representing organized dentistry, organized medicine, the health departments of the public and parochial schools, the City

Professor of Dental Research, School of Dentistry, University of Pittsburgh.

Department of Public Health, the city water works, and the lay interests of the city" has been appointed. This committee has not made its final report.

The Dental Advisory Committee to the Department of Health of the City of Pittsburgh proposed the fluoridation of water. The City Council has appropriated $25,000 for the purchase of sodium silicofluoride for treatment of the 85-95 million gallons of the city owned portion of the water supply for the year 1951. The installation of equipment is at present under study. The project has the approval of the dental and medical societies.

Dr. Grace reports that inquiries concerning the addition of fluoride to the public water supply have been received from Bradford, Bristol, Brookville, Clarks-Green, Erie, Grove City, Hanover, Midland, Milton, Oil City, Palmerton, Reading, Reynoldsville, Rochester, Schuylkill Haven, York, as well as from the cities discussed above. Generally, these inquiries have been single communications with no follow-up.

The author will appreciate communications from dentists so that a more satisfactory round-up of progress of fluoridation can be made in another six months.

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SODIUM FLUORIDE
OK PENN-SYLVA-NIA DEPT OF HEALTH
PROGRESS IN DENTAL HEALTH
FORD CITY, PENNSYLVANIA FIRST TO FLUORINATE WATER SUPPLY.
WALT PARTY-MILLS

The Gazette and Daily, York, Pa., Feb. 23, 1951

Additional Fluoridation Items

FLUORIDATION OF PUBLIC WATER SUPPLIES
REQUIREMENTS FOR APPLICATION

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PENNSYLVANIA DEPARTMENT OF HEALTH

The addition of a fluoride to public water supplies in order to control and reduce dental caries requires a permit from the Pennsylvania Department of Health. The requirements of the Bureau of Sanitary Engineering of the Department of Health for receiving and reporting to the Secretary of Health upon applications for such fluoridation treatment are as follows (March 1, 1951):

The Bureau will accept applications for permission to apply fluoride to a public water supply for the control and reduction of the incidence of dental caries.

Such application shall be submitted, in duplicate, by responsible officials in charge of the public water works, and shall be accompanied by written endorsement of the fluoridation program by the local Health, Medical and Dental Societies.

It is suggested that communities considering the adoption of fluoridation of public water supplies investigate local conditions to determine whether or not interference with industrial processes in the community will result from fluoride treatment.

I. *Application*

The application shall be accompanied by a detailed report and plans, in duplicate, of the proposed treatment program. No filing fee is required.

A. The report shall specifically include:
   1. Present fluoride concentration of the water supply.
   2. Fluoride compound to be used.
   3. Equipment to be used for the introduction of the fluoride.
   4. Upper and lower dose limits of the equipment.
   5. Facilities available for the daily determination of the fluoride content of the raw and treated water.
   6. Safety equipment available for the protection of the operators.

B. The plans shall include:
   1. Detailed plans of the fluoridation equipment.
   2. Location of the equipment in relation to the other units of the plant.
   3. Point of application.

II. *Operation*

The proposed operation shall provide for:

A. The application of fluoride only by means of precision feed equipment

of a type approved by the Pennsylvania Department of Health.

B. Dosages so controlled that not more than 1.5 parts per million of fluorides will be present in the water supply at any time.

C. Equipment of such design that no back siphonage from it into the public water supply system can occur.

D. The equipment for the fluoridation of the water shall be used exclusively for such purpose.

III. *Control*

A. Tests shall be made to determine the fluoride content of the raw and of the treated water throughout the distribution system daily, or at such other intervals as may be specified by the Pennsylvania Department of Health.

B. The method of determining fluoride concentration shall be in accordance with the latest edition of Standard Methods for the Examination of Water and Sewage. The Taylor colorimetric test may be used to facilitate adjustment of dosage, but shall not replace the aforesaid required Standard Methods test.

C. Operation reports shall be submitted to the Bureau of Sanitary Engineering at intervals specified by the Pennsylvania Department of Health.

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A MEDICAL SOCIETY VIEWS FLUORIDATION

(The following editorial, titled "Fluoridation of Water Supplies," appeared in *The Bulletin* of the Lancaster City and County Medical Society, Lancaster, Pa., 24: April, 1951. Edgar W. Meiser, M.D., is editor-in-chief.)

OVER the past twelve years a great epidemiologic evidence has been gathered which definitely indicates that where the fluorine ion is naturally present in public water supplies, the prevalence of dental caries in permanent teeth is less by 60%. This evidence also indicates that the fluorine ion is the active caries inhibiting factor, and further that maximum protection and maximum safety is obtained by concentration of 1 part per million.

All the accumulated evidence, further indicates that artificially added fluorines produced exactly the same results as natural fluoride water.

There are no toxic effects from the ingestion of fluorides in drinking water containing as high as 5.5 part per million other than mottling of the tooth enamel, known as dental fluorosis. When it is realized that there are approximately 8,000,000 people in the United States, who have been consuming water from wells containing 1 to 27 part per million throughout their entire lives, and except for dental fluorosis only in the higher concentrations, show no toxic effects, we must be convinced of its safety in the recommended concentrations.

The Wisconsin State Dental society considered this subject so important that in 1943 they appointed a Fluorine Study Committee. After two years of study and a similar study conducted by the Wisconsin State Board of Health, a resolution was passed encouraging cities to add fluorides, not to exceed 1 part per million to their public water supplies. Two years later, in 1947, this resolution was amended to permit a 1.5 part per million maximum fluoride concentration.

Long standing similar controlled observations of the addition of fluorides to the water supplies have been conducted in

Ontario, New York, and Texas, and all show the same remarkable reduction in dental decay rates, following the fluoridation of their public water supplies. Since 1949 such programs have been endorsed by the State and Territorial Dental Health Directors, The United States Public Health Service, and the American Water Works Association. Certainly the opinion of such authoritative bodies should dispel any lingering doubt about the advisability of fluoridation of communal drinking waters. The Pennsylvania State Health Department stands ready to advise and assist any community desiring to adopt the procedure.

The information is reliable, the method is proven. The merit of the program is unquestionable. It is the most important discovery for dental caries control as yet advanced. Fluorine in controlled concentrations as recommended is not a toxic poison, it is not a medication, but rather an element in nutrition. The procedure is simple, and most inexpensive.

At the last meeting, this society, at the invitation of the Harris Dental Society, endorsed a program of fluoridation of the city water supply. This article is intended for your use when the skeptics who would oppose this plan begin their arguments against it. They will probably be those same skeptics who so vigorously opposed chlorination of water supplies, not too many years ago.

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FLUORIDATION INFORMATION AVAILABLE

THE American Dental Association, through the Council on Dental Health, has prepared a manual titled "Fluoridation in the Prevention of Dental Caries." The foreword is as follows: The fluoridation of public water supplies is now widely accepted as another method for reducing the prevalence of dental caries. Of all the preventive methods in use, including toothbrushing, restriction in the consumption of concentrated sugar and topical application of sodium fluoride, fluoridation offers the greatest hope for preventing caries because of its easy application for large numbers of people and its relatively low cost.

This discussion, the foreword continues, is not intended to be a complete treatise of all the available knowledge on the use and effect of fluorides. However, it will provide general information for the guidance of dental, medical and public health officials in recommending fluoridation to city officials.

The manual, among other items, considers the following: endemic dental fluorosis, the mechanism of fluorine action, fluorine content of sound and carious teeth, the fluoride effect on lactobacillus counts, the fluoride intake in water and food, fluoride metabolism, toxicity of fluorides, specifications and concentrations and the technical control of these concentrations, the fluoride compounds used, the mechanical procedures for fluoridation, safety measures, the cost of fluoridation, and the present results of fluoridation projects up to early 1951.

With interest in fluoridation increasing, the ADA in making this manual available for distribution has rendered an excellent service to its members. Here, in convenient form, is a summary of the data to February, 1951. It is a ready reference guide for answering questions on the technical aspects of this caries-preventive procedure, including the procedures for installation, the cost, and a list of firms

from which equipment and materials can be purchased.

A copy of the booklet may be obtained by writing the Council on Dental Health, American Dental Association, 222 East Superior Street, Chicago 11, Illinois. Quotations for large quantities—25, 50, and 100—will be supplied on request.

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FOLLOWING APPROVAL OF FORD CITY FLUORIDATION
Secretary of Health Teague - Governor Fine - Senator Pechan

SCHOOL SHORTS

PENNSYLVANIA

Faculty honors. Mr. Henry Rainey has been mustered out of retirement and appointed Curator of the Evans Dental Museum. Three staff members, Drs. Grossman, Ennis, and Krogman will participate in the seminars given by the University of Illinois Telephone Extension Service during 1951-52. Dr. J. P. Looby was named president-elect of the Philadelphia County Dental Society. Dr. J. J. Bentman recently was named a consultant in periodontology to the Veterans Administration. Dr. Raymond Werther has been made a diplomate of the American Board of Pedodontics.

Faculty speakers. The American Denture Society heard a paper on "The Appearance Phase of Denture Construction" by Dr. M. M. DeVan in early March. Dr. Harrison Berry spoke before the Cumberland County Study Group (N. J.) in March on "Cysts of the Jaws." Dr. Raymond Werther addressed the Mercer County Dental Society (N. J.), the District of Columbia Dental Society, and the Temple Junior ADA on everyday problems of pedodontics recently. Dr. Lester Burket has spoken at the Walter Reed Hospital, the Alumni Association Meeting of the School of Dentistry, University of Kansas, the American Association of Dental Schools, and the Conference on Dental Health, University of Pittsburgh, within the past two months: the general topic of his discussions was oral diagnosis. Dr. Jules Kneisel presented a paper on the self-curing acrylic materials at the March meeting of the Pennsylvania Association of Dental Surgeons. Drs. Appleton, Berry, Burket, Grossman, Masino, Meloy, and Rode participated in a clinical conference before the Middlesex County Dental Society (N. J.) in March. The North Philadelphia Association of Dental Surgeons and the Hudson County Dental Society (N. J.) heard Dr. Thomas Meloy discuss the importance in general practice of dentoalveolar surgery at the meeting in March. Dr. Appleton talked to the biology club of Ursinus College on the "Biologic Factors in Dental Caries."

PITTSBURGH

Seven members of the faculty attended the meeting of the International Association of Dental Research at French Lick, Indiana, March 17-19; nineteen members attended the meeting of the American Association of Dental Schools at French Lick, March 19-21.

Dr. R. I. Crumpton spoke before the Northside Dental Society on "Prosthesis," March 14.

Dr. G. J. Cox addressed the Wisconsin State Dental Society meeting in Milwaukee, March 28, on "Prevention and Control of Dental Caries" and the Dental Hygienists and Assistants on the same day on the subject "Diet."

Dr. L. H. Roth spoke on the subject "Aureomycin in Dentistry" before the U. S. Naval Reservists at Pittsburgh on April 4 and to dentists in Fairmont, West Virginia, on April 7 and in Oil City on April 19.

Attendance at the Fourth Annual Conference on Dental Health on April 18 was 320 including 145 dentists and 13 waterworks men.

At the Omicron Kappa Upsilon dinner on April 18 Dr. C. M. Markell, 1921,

of Los Angeles, California, was elected an honorary member. Drs. Sidie Bononi, Clair M. Bunting and Carl A. Flecker of the faculty were inducted into membership and seniors Adamson, Barrickman, Cerveris, Everhart, Hall, Jewell, Lichtenfels, Loutzenhiser, Piccoli, Steele, Wells and Zellers were inducted into membership with Walter L. Jewell receiving first honors and Theodore R. Loutzenhiser second.

On April 20 all students took the "Examination in the Subject Matter of Cancer" under the auspices of the Cancer Research Institute, University of California.

Dr. J. C. Eselman gave a clinic before the Cambria County Dental Society in Johnstown on March 26. Dr. V. A. Westin gave a clinic to the Westmoreland County Dental Society meeting at Greensburg on April 10.

Drs. H. C. Metz, H. C. Metz, Jr., and E. J. Laskowski attended the meeting of the American Society of Orthodontists in Louisville, Kentucky, April 23-26. Dr. G. J. Cox gave a paper at this meeting on April 26 on dental caries in relation to orthodontia.

Dr. W. Harry Archer spoke before the Annual Homecoming of the Dental Alumni of the University of Toronto on the subject of "Oral Surgery" on April 26.

TEMPLE

On March 19, 20, 21, Dean Timmons, Drs. Hedges, Rowen, Ritsert, Pallardy, McMurray, Herman, Cobe, Ewing, Gregory and McKechnie were at French Lick, Indiana, attending the annual American Association of Dental Schools meeting.

Dr. James R. Cameron returned recently from a vacation trip to Puerto Rico and the Carribean.

In the recent Red Cross Drive for blood donors, over 200 pints of blood were given by the students of the Dental School in a period of two days.

Dr. Denton Kuhn, former Instructor in the Crown and Bridge Department and now with the U. S. Navy, is in French Morroco for duty.

Dr. William Updegrave, professor of radiodontics, appeared before the Binghamton, N. Y., Rhode Island, Broome County and Bridgeport Dental Societies, the Rhode Island State Dental Hygienists Association, and the Harrisburg Dental Society.

Several members of the TDS Faculty are now in or will shortly enter the service. Dr. Dale Roeck, former instructor, is now with the Air Force in Texas. Dr. Peter T. Cassalia, instructor in oral surgery, a Lt. in the Marine Corps is in Korea. Dr. Leonard Parris, instructor in endodontics, has enlisted in the Air Corps and Dr. Frank Sammartino, instructor in radiodontics, leaves in May for the Air Force base in New York State.

Dr. Ernest Ritsert, professor of pedodontics, participated in a television show on Dental Health recently and also was honored in St. Louis when he became a diplomate of the American Board of Pedodontics.

Dr. Robert Hedges, Director of the Orthodontics Clinic, was in Chicago the week of March 5 to attend an Orthodontic meeting of the University of Illinois. While there he served as a chairman of one of the programs.

DISTRICT NEWS

By FRANK W. BUTLER, Reading

FIRST DISTRICT

A combined meeting of the Dental Staff of the U. S. Naval Hospital and the Philadelphia County Dental Society was held April 4, in the Auditorium of the Naval Hospital. The essayist was Dr. James R. Cameron, who spoke on the subject "Oral Lesions and Deformities of Interest to the Physician and Dentist."

At the meeting in March officers for the coming fiscal year were elected, and they are as follows:

President—Albert L. Borish
President-Elect—John P. Looby
Secretary—Robert Adams
Treasurer—Paul R. Schock
Librarian—William H. Magann
Three members of Board of Governors—Paul Piscator, Edward Strayer, R. E. DeRevere.

After a pre-meeting dinner, the Philadelphia Society of Periodontology, on March 27, held its annual election of officers, Dr. Herbert Fischer was selected to fill the president's office for the coming year. At this same meeting, a paper on "Surgery in Periodontal Treatment" was presented by Dr. Paul Schluger.

Dr. John Jacob Posner was the speaker at the meeting of the Eastern Dental Society of Philadelphia held in the Bellevue-Stratford Hotel, April 19. This occasion was known as "Dr. William Ersner Memorial Night."

"The Treatment of the Periodontal Pocket" was the subject of Dr. John H. Stine, when he addressed the Pennsylvania Association of Dental Surgeons on April 10. This meeting was played to standing room only, having been held in the University Club.

On April 16, The Pennsylvania Society of Dentistry for Children, held its regular meeting in the lounge of the Medical Tower Building. Dr. M. M. Album spoke on "The Dental Problem in Cerebral Palsy."

The last scientific meeting of the year for the Sigma Epsilon Delta Fraternity will be held May 16 at which time Dr. Samuel Klaus will talk on "Materia Medica and Prescription Writing for the General Practitioner." —W. V. SCANLAN.

SECOND DISTRICT

The Montgomery-Bucks Dental Society conducted a full day of clinics March 28, at the Valley Forge Hotel, Norristown, Pa. Dr. Brice Dorsey, Professor of Oral Surgery, at Baltimore College of Dentistry, spoke on "Swellings of the Face, Neck, and Oral Cavity." An unusually large attendance attested to the general interest in his topic, which he expounded in a clear, concise and efficient manner. His lecture was profusely illustrated by Kodachrome slides, and his manner of delivery, soft and modulated kept his audience in a constant state of undivided attention. Dr. H. Vernon Lapp presided over a short business meeting which followed the main event, which in turn was followed by session of socializing, mainly at the dinner table. Dr. Dorsey resumed his discussion with a discourse on "Surgical Procedures Involving the Mouth and Jaws." His technic ran the gamut of surgical methods of daily office cases, interspersed with an occasional bit of major oral surgery which once again engrossed his listeners. The program director, Dr. Charles Apple, is to be complimented on his arrangements and selection for this program. The Annual Outing will take place on the third Wednesday in June.

There was held an executive meeting of the Second District, April 5, at Valley Forge Hotel, Norristown, Pa., at which session, Dr. Joseph Tuckerman presided.

The monthly meeting of the Dental Society of Chester and Delaware Counties was held March 21, at the Club House in Chester, Pa. The Society passed a resolution to have a combined group of physicians and dentists consider the possibility of adding fluorine to the water supply of Delaware and Chester Counties. A large group in attendance at this meeting saw Dr. Frank B. Gardner of Scranton, give a clinic on the uses of the self-curing resin materials in tooth restorations. There followed a dinner after which Dr. Gardner showed Kodachrome slides of cases completed by him in the course of his practice.

—MARK J. SABLOSKY.

THIRD DISTRICT

Since we have for some reason or other slipped up on reporting our news since February, we will begin at that month and publish our activities, in so far as it is within our endeavors, up to the month of April. The February meeting of the Scranton District Dental Society took the form of a banquet, given in honor of our retiring president, Dr. Joseph Newman. To him and to his ten predecessors, were presented suitable plaques suitably engraved and attesting to their fidelity to the Society.

Our clinician for the March meeting was Dr. David Ast, Director of the Bureau of Dental Health in the New York State Department of Health. Dr. Ast is a recognized authority on the fluoridation of water supplies, and the meeting was held to be of such importance that there were attracted to it, in addition to our regular membership, representatives of the Scranton Spring Brook Water Company, the State Department of Dental Health, the engineers and officials of the Pennsylvania State Department of Health and the members of the Lackawanna County Medical Society. The large attendance at this meeting was very gratifying, and the Society feels that it is really undertaking something worth while.

Your District Editor has one special request, to wit: Since the Third District is not only comprised of the Scranton Society, but of the Luzerne, Panther Valley, and Hazleton Societies as well, she feels that their news should appear in this column as well; and to this end she would appreciate it very much if the Secretaries of these Societies would send her any and all news of their organizations, and she will see to it that these items will reach the News Editor of the JOURNAL. Your information should be sent to your district reporter at 1413 Ash Street, Scranton.

—ELSIE COLE.

FOURTH DISTRICT

For the past several years the Reading Dental Society has been endeavoring to bring together those elements which make for a better understanding within the professional domain. Since 1949, we have met, once annually, with the men who make our prosthetic appliances possible, and on March 5, in Medical Hall, we continued our friendly relations by having another of these joint affairs. There were representatives of all nine dental laboratories in the city together with fifty-one of our own members gathered to hear Dr. Sumner Pallardy, Professor of Prosthodontia, Temple University, discuss the "Problems of Dentist and Technician." He brought a freshness to an arid subject that only a man of his type can, and he clearly demonstrated by his illustrated talk, how many of the problems confronting both dentist and technician may be ironed out. It was but natural that having listened to a lecture on the masticatory apparatus, we should give it some exercise, and to this purposeful end, the committee on arrangements, one of the finest of whom we have which, uncovered, what we have endeavored many times to describe in these columns, as a Dutch Lunch. Anyone up in Erie County desiring information on the first ingredient of a Dutch Lunch, should contact Ken Davis.

Our April meeting is always a high spot in the year, and on the 18th we observed our Tenth Joint Meeting with the Reading Eye, Ear, Nose and Throat Society. This year it fell to our Society to be the host, and to this end our committee on arrangements put together an affair that was an affair. Nearly two hundred members of both societies gathered at the Abraham Lincoln Hotel at Reading, and enjoyed a program that ranged from clinics to food and back again to Dr. Herbert K. Cooper, who spoke very ably on "Cleft Palate, Its Care and Treatment."

The Study Club, after having a very successful joint-meeting with the Society in March fell into an April lethargy, at its monthly meeting, and, gathered around a round table, tossed old Taurus for a couple of loops in the grand manner.

The Dental Seminar, at its regular April meeting in the Board Room of the Community General Hospital were treated to a very interesting discourse on Oral Diagnosis, by Dr. J. J. Bentman, instructor in that subject at the University of Pennsylvania.

The Ladies' Auxiliary, the newest of our contemporaries, is a real up and coming organization. Just a little over a year in age, and already it has outgrown its swaddling undergarments. It has been holding its regular monthly meetings in Medical Hall every third Monday of each month, (that makes poppa an infant-sit-downer for the evening), and from all reports the girls are really getting things down. In the recent Red Cross Drive, they were in there swinging from the floor-boards, and they actually went to town and suburbs when it came to collecting the moolah. To date they have a membership of eighty-six; if it gets much bigger, we'll have to find out who's married twice, and is still growing. The Auxiliary this year is under the leadership of Mrs. J. Russell Bohn, who is ably assisted by a very active program committee. Mrs. Harry Willits is Treasurer of the Pennsylvania State Auxiliary, while Mrs. Henry Deibert is a member of the State Nominating Committee, which group will function in the selection of nominees for the State Offices at the September meeting. As of now, we believe that the Reading Auxiliary is the second largest in the state—let's have more of them, the girls do a good work. Oh yes! They have arranged for something special in May, but more of that later.

—F. W. BUTLER.

FIFTH DISTRICT

The February meeting of the Harrisburg Dental Society was highlighted by a symposium on orthodontics. Dr. J. J. Lucas, chairman of the program committee acted as moderator and led the members in an enlightening discussion. Everybody eagerly participated and left the meeting feeling that the exchange of ideas made for a better understanding no matter what the subject. The Society has accepted, as a group, the plan of the Blue Shield, and in so doing, felt that they had taken a beneficial step forward. The Annual Spring Dance was held in the American Legion, Post No. 27, Home, on April 13. The ballroom of the Legion had been newly appointed and provided a beautiful setting for this annual affair. Standing invitations to members of the Pennsylvania State Dental Society to attend this affair are a part of the program.

—S. H. YOFFE.

The Harris Dental Society continues merrily on its way to greater heights. Many pints of aqua pura have slid silently over the dam since our last report, and we might state that our March meeting held at the Lancaster Cleft Palate Clinic was slightly more than a huge success, the overflowing attendance attested to that fact. Dr. Brotman very ably presented to us a new and more enlightening aspect of the hydrocolloid methods. The program instigated by our society during Dental Health Week for fluoridation of

the water supply to Lancaster City and surrounding territory has been accepted nicely by city officials and the Water Department, and at the same time has been approved by the Lancaster County Medical Society. We hope to have further backing from Service Clubs and Parent Teacher groups in the near future.

The April meeting brought to us Dr. Lester Burket of the University of Pennsylvania Dental School, whose presence is always a refreshing reminder of current topics dental. The feature for May will be our annual dinner dance to be held on the 23rd. The Ladies' Auxiliary, after carefully instructing their friends and neighbors on the technic of house-cleaning, held a very successful Rummage Sale last month, April, that is, and the proceeds, naturally, went to their pet project, the Cleft Palate Clinic. The Auxiliary meets on the first Tuesday of every month, in the Hotel Brunswick, just in case a visiting sister be in town on that evening, she will know where to hie herself. In passing we must make mention of the fine Medical-Dental Bureau which we, together with the Medical Society have succeeded in bringing into operation. The Bureau is doing an excellent job for the two professions in this community. Let's all turn to and give it a big up-lift right now. (Ye district Editor would have, by return mail, Jimmie Fackler's conception of "up-lift.") —JAMES FACKLER, JR.

SEVENTH DISTRICT

The Cambria County Dental Society at its regular March meeting was treated to something novel in the way of clinicians. Dr. J. C. Eselman, University of Pittsburgh presented as his topic "A New Concept on Interpreting Localized Alveolar Bone Changes." Dr. Eselman's method of discussing this topic was unique, and at the same time highly instructive; he made an apparently dull subject to shine out from its proper niche in dentistry. A discussion was held regarding the United Mine Workers Welfare Fund, and it was suggested by Council that all estimates should be based on the minimum fee scale. The secretary was asked to correspond with Mr. Ray Cobaugh, Executive Secretary of the Pennsylvania State Dental Society, in regard to reinstatement of members who have relinquished their membership. Dr. Wicks, chairman of the Military Affairs Committee, explained that his group was to work with the Selective Service Boards and make recommendations, the final decisions being the duty of the Boards. A suggestion was made that the Fluoridation Committee acquaint themselves with information furnished by the State Trustees, in order that recommendations may come from the Dental Society rather than from outsiders on fluoridation supplies.

The Ladies' Auxiliary of the Cambria County Dental Society held their regular March meeting in the Capitol Hotel, Johnstown, Pa., March 26. Following the business session a very entertaining evening of bridge was enjoyed, during which a light, non-disfiguring repast was served. —H. M. DUNEGAN.

EIGHTH DISTRICT

The regular meeting of the Bradford Dental Society was held in the form of a dinner meeting in the Hotel Emery, March 12. The routine business of the society was dispatched with initiative fervor. This preceded our last number on the telephone extension course and was unusually well attended.

The Society held a meeting in the Venetian Room of the Hotel Emery, on April 11, to which were invited the physicians, educational heads, nurses, wives and assistants of the medical and dental practitioners in the district. Dr. J. W. Lang, of Meadville, was the guest speaker, and he gave a lecture and demonstration of "Psychosomatics and Their Therapeutic Relationships and Values." Dr. Lang performed an extraction during this

demonstration, which was witnessed by the largest turnout of the year.

The Annual Meeting of the Eighth District will be held at the Kane Country Club, June 22. It would be advisable to mark this date on your calendar as of the present moment. Plan to make this date one long to be remembered, so that it might not be said that you were among the missing on the Twenty-Second Day of June A. D. More details concerning this event will be published at a later date.

—L. ROBERT CUPP.

NINTH DISTRICT

The regular monthly meeting of the Crawford County Dental Society was held in New Gray's Hotel, Meadville, Pa., March 27. Dr. Robert Wade of Erie, who confines his practice to prosthetic dentistry, read an excellent paper on "Faults of Full Dentures," followed by explanatory slides. Your news reporter as of March 31, departed for a much needed vacation, during which respite from the plaster bowl and scaler, he will visit Williamsburg and Norfolk, Va., and from thence meander up the shore line to the East Side of New York, the Bowery, Hell's Kitchen, the Bronx, and mebbe take a flier at the Stork Club or reasonable facsimile. He expects it to take two weeks altogether, (hardly long enough to get his feet damp in the Hudson River). When he returns, he trusts that he will find awaiting him, some news of the neighboring counties of the Ninth District. A conference with Ken Davis at the next District meeting is scheduled, anent pretzels.

—C. J. FRISK.

The March Scientific meeting of the Erie County Dental Society was held at the Moose Club, March 21. The clinician was Dr. S. W. Koepf, Chief Oral Surgeon, Veterans Hospital, Buffalo, New York. Dr. Koepf's subject was "Antral Complications in Oral Surgery." The lecturer had just recently joined the Veterans Administration, having formerly been engaged in private practice in Buffalo. He provided us with a genuinely interesting and instructive evening, his clinic containing a worthwhile review of antral anatomy and the correct procedure in the event of antral complications. By the time this appears in print the Ninth District Spring Meeting at Conneaut Lake, June 1-2, will have become a much anticipated gathering. As of now the program has all the indications of being an excellent one, and it is urged, by the committee on arrangements, that no effort be spared by every member of the District to be present at this event. Let's all take those two days for a bit of instruction, rest and relaxation.

The creation of the Dental Health Room at the Public Museum under the sponsorship of the Ladies' Auxiliary will soon be a reality. Actual construction of the room having been started in April, the date for completion having been tentatively set for some time in August. The members of the Auxiliary gave a party recently, the proceeds of which were used toward the purchase of equipment for the Dental Health Room. The members are at the present time, also working on individual projects.

On March 14, the Society upon invitation, visited the recently completed Erie Veterans Hospital, upon a pre-opening tour of inspection.

—KEN DAVIS.

TENTH DISTRICT

The Odontological Society cooperated with the School of Dentistry, University of Pittsburgh, in sponsoring a successful Fourth Annual Conference on Dental Health April 18. The morning sessions were concerned with fluoridation, and the afternoon sessions considered oral aspects of systemic disease and the diagnosis of intra-oral cancer.

The May meeting will take place in the Penn-Albert Hotel, Greensburg (the Spring Meeting traditionally is held outside of Pittsburgh in one of the branch

areas). The speaker will be Dr. M. M. DeVan, Philadelphia; his subject—Full Denture Prosthesis, an illustrated talk.

Pittsburgh will be host for the Annual Meeting of the State Society September 11-13. Essayists and clinicians will be announced in the June issue. Also, the preliminary program will be published.

GREATER PITTSBURGH

AND

PENNSYLVANIA STATE DENTAL SOCIETY

Combined Meeting

WILLIAM PENN HOTEL **PITTSBURGH, PA.**

SEPTEMBER 11-12-13, 1951

Preliminary Program in June Issue

DEATHS

FORMER PRESIDENT DIES

WILLIAM L. Fickes, for over 40 years a member of the faculty of the School of Dentistry, University of Pittsburgh, and president of the Pennsylvania State Dental Society during 1923-24, died at Steubenville, Ohio, March 30, at the age of 82.

Dr. Fickes was appointed to the chair of ceramics at Pitt in 1904, and retained his professorship until retirement in 1947. He was among the first dentists in Pittsburgh to enter the specialty of porcelain work as applied to dentistry. He was a frequent contributor to the journals with articles on the use of porcelain. For many years he conducted a practice in the East Liberty district.

Also active in dental organization in Pennsylvania, Dr. Fickes served as secretary of the State Society before becoming president in May, 1923. He was an energetic member of many committees in the State Society, and also served as chairman of the committee on nomenclature of the American Dental Association and the American Association of Dental Schools.

BLEWETT, Joseph, Reading; School of Dentistry, University of Pennsylvania, 1914; practitioner in Reading for 37 years; died January 31, aged 65.

BLITZ, C. A., Tamaqua; veteran of Spanish-American War; died in Veterans Hospital, Dayton, Ohio, March 19, 1951.

DAVIS, Howard M., Scranton; died January 3.

DINGMAN, Florence, Johnstown; Pennsylvania College of Dental Surgery, 1907; died December 3, aged 77.

LAWLOR, J. J., Shenandoah; University of Maryland, 1925; died February 14, aged 50.

NOWINSKI, Stanley, Pennwynne; Scranton University; Temple Dental School, 1949; instructor in periodontics at Temple; died February 25, aged 25.

ROSE, A. J., formerly of Knox; died recently at Marlin, Texas.

UFBERG, D. D., Shamokin; Temple Dental School, 1936; died January 13, aged 41.

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